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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,356	11/03/2003	Mari Inoue	04329.2802-01	1137

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FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

EXAMINER

ROSASCO, STEPHEN D

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 05/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/698,356

Applicant(s)

INOUE, MARI

Examiner

Stephen Rosasco

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2003.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6-12 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 6-12 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 03 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11/03/03.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

The disclosure is objected to because of the following informalities: there are numerous spelling and grammatical errors present, e.g., page 2, line 16, "which to increases"; page 4, line 5, "according to on"; page 5, line 5, "so as to makes it".

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 6-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Harazaki (6,335,981) or Behun et al. (6,654,488) in view of Usui et al. (6,617,083).

The claimed invention is directed to a method for manufacturing a photomask and a method of making a semiconductor device using said mask, and in which a light transmitting pattern portion and a light shielding pattern portion are arranged for forming a predetermined optical image pattern on the surface of a substrate, comprising: calculating a pattern area ratio to the area of the photomask, from the design data of a given layout pattern of the photomask, and a pattern density, which is a ratio of the area of the light transmitting pattern portion or the light shielding pattern portion within said region to the area of the region extracted from the given layout pattern; estimating the XY difference of the formed pattern from the calculated pattern area ratio and the pattern density; covering the case where a pattern is formed on the photomask by using the design data of the imparted layout pattern;

and imparting a correction amount to said imparted layout pattern based on the estimated XY difference.

The applicant states that in the manufacturing process for a semiconductor device or a photomask, it is generally known to the art that the process size is changed depending on the pattern aperture rate or the pattern density by the micro loading effect in the step of the developing process or the dry etching process. In general, the size of the pattern on the photomask is several times as large as the size of the image transferred onto the wafer, with the result that the pattern aperture rate of the photomask greatly differs depending on the layer, which increases the variations in size generated by the difference in the aperture rate.

And that in devices having a large variation in density the difference in density of the patterns among the different regions on the photomask is increased by the diversification of the devices. As a result, the change in size caused by the micro loading effect has obstructed the improvements in the dimensional accuracy and positional accuracy corresponding to the demands for the miniaturization.

Harazaki teaches a method for correcting a pattern of a photomask for forming a desired photoresist pattern on a wafer by exposing a photoresist by an exposing device through a photomask which has been made by a photomask drawing device, the method comprising:
determining a predetermined value based on exposure wavelength, numerical aperture, and coherent factor of the exposing device and based on a minimum feature size of the photomask drawing device; designating a region whose distance from an edge of the photomask is not more than the predetermined value as an optical proximity effect effective range; and carrying out correction with respect only to the optical proximity effect effective range.

And wherein transparent pattern density is determined in said optical proximity effect effective range so as to carry out correction for a pattern shift during photoresist development with respect only to a region whose transparent pattern density is not less than a threshold value.

Behun et al. teach a method for inspecting a semiconductor photolithographic mask having a patterned portion for selectively exposing light to a semiconductor wafer for forming a desired pattern thereon and having one or more non-critical fill pattern areas used to achieve a desired design pattern density, the method comprising: implementing an inspection tool of a predetermined sensitivity level on a desired pattern; identifying a selected shape formed in said mask that designates a fill pattern area; and in response to said identifying, one of: reducing a sensitivity level of said inspection tool and inspecting the identified fill pattern area at the reduced sensitivity level, or omitting inspection of the identified fill pattern area, whereby non-critical fill pattern areas are easily recognized during said photomask inspection to thereby increase inspection throughput.

Usui et al. teach, see FIG. 11, which shows a correction target sub-area A3 and a peripheral area A4 made of sub-areas surrounding the sub-area A3. The sub-area A3 has a pattern density of, for example, 20%, and the peripheral area A4 has a pattern density of, for example, 50%. A correction quantity retrieved from a correction data table corresponding to the pattern density in the sub-area A3 is provided with a weight of 80%, and a correction quantity retrieved for the peripheral area A4 is provided with a weight of 20%. Thereafter, patterns in the areas A3 and A4 are corrected accordingly.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'S. Rosasco', with a stylized, looped initial 'S'.

S. Rosasco
Primary Examiner
Art Unit 1756

S. Rosasco
04/07/05